

CAREX RHYNCHOPERIGYNIUM (CYPERACEAE),
A NEW SPECIES FROM HIDALGO, MEXICO, AND
A KEY TO SPECIES OF MEXICAN AND CENTRAL
AMERICAN *HYMENOCHLAENAE*

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ABSTRACT

Carex rhyngoperigynium, a new species of section *Hymenochlaenae*, is described from the Nonoalco area of northeast Hidalgo, Mexico. It differs from its putative closest relatives (*C. conspecta*, *C. brunnipes*, and *C. ixtapalucensis*) in having: purple, basal, bladeless sheaths and purple lower leaf sheaths as opposed to brown; perigynia pale green turning brown with age, not green and neither red-dotted nor purple-mottled; and wider achenes. The new species was found locally frequent in the spray of a waterfall. An updated key to the species of Mexican and Central American *Hymenochlaenae* is included.

Carex section *Hymenochlaenae* (Drejer) L.H. Bailey includes 58 species worldwide, with about 30 species in North and Central America, and 28 additional species in Eurasia and adjacent North Africa, with one apparently endemic to East Africa (Reznicek 1986). In 1986, Reznicek treated 13 species that occur in Mexico and Central America and in 1990 described habitats for the *Hymenochlaenae* as moist montane forests, wet meadows, and stream banks at 1500 – 3700 m.

***Carex rhyngoperigynium* S.D. Jones & Reznicek, sp. nov. WATERFALL CAREX.**
(Fig. 1):

Plantae cespitosae; culmis fertilis 95 – 98 cm altis; vaginis basales purpureis, glabris. Folia 5 – 11, plerumque basales; laminis 19 – 46 cm longis, 3.2 – 7.1 mm latis; vaginae 3 – 15 cm longae, glabrae; ligulis 5 – 6 mm longis. Inflorescentiae 18 – 31 cm longae; spicis 5 – 7, 2 – 4 spicis terminalibus staminatis; spicis lateralibus pistillatis vel androgynis, pendulis antrorse scabris; bracteis infimis laminis 29 – 32.5 cm longis, 2.5 – 3.0 mm latis atque vaginae 3.4 – 4.3 cm longis. Perigynia 3.5 – 4.2 mm longa, 1.3 – 1.8 mm lata, trigona, plerumque dilute viridia demum brunnescentia, glabra, rostris laevibus, patentibus vel reflexis 0.9 – 1.4 mm longis.

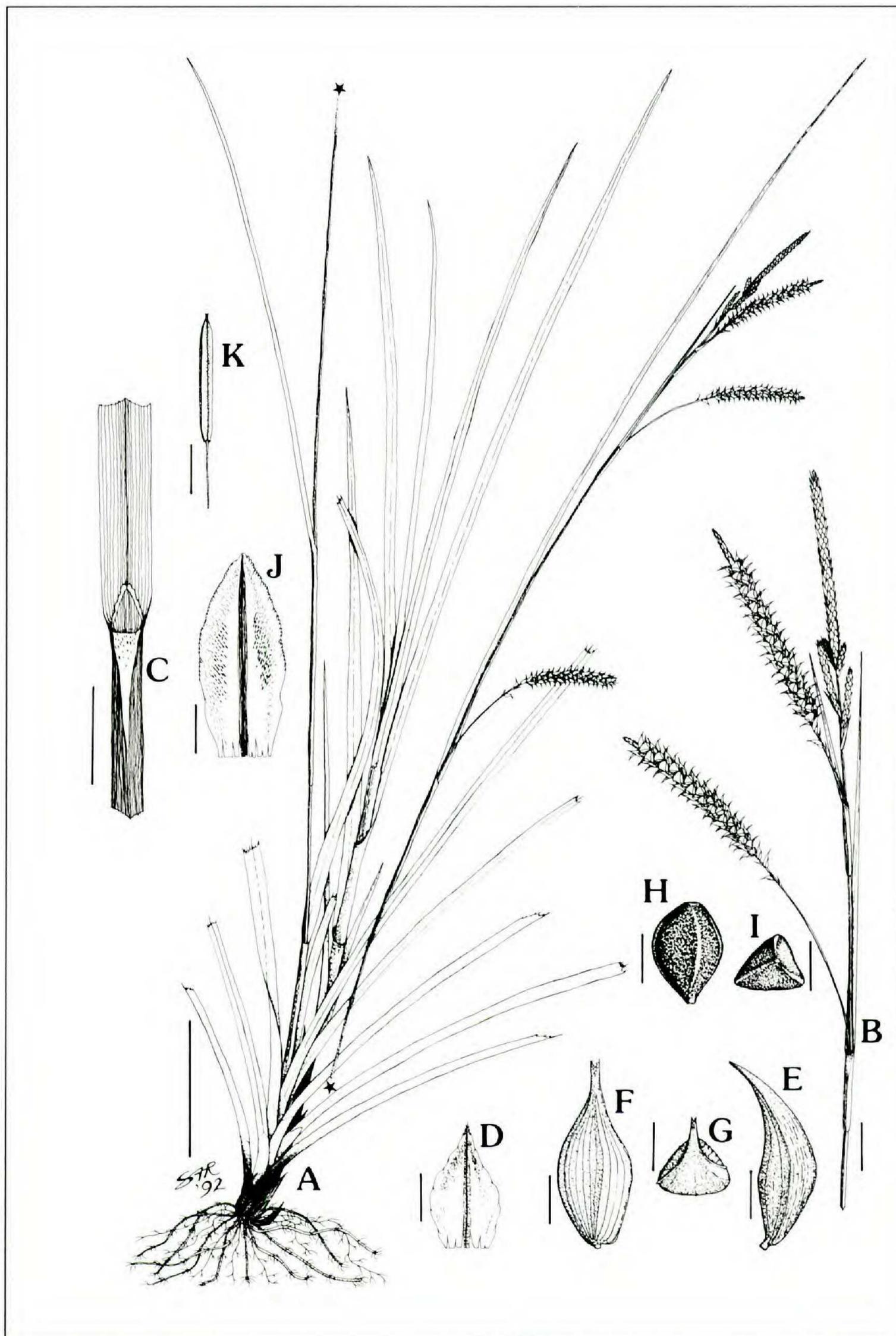


FIG. 1. *Carex rhynchoperigynium*, drawn from S. & G. Jones 5543 (MICH), holotype, A. Habit. B. Inflorescence. C. Sheath and Ligule. D. Pistillate scale. E. Perigynium, side view. F. Perigynium, front view. G. Perigynium, top view. H. Achene, front view. I. Achene, top view. J. Staminate scale. K. Anther. Bar equals 10 cm in A, 1 cm in B – C, and 1 mm in D – K.

Achenia 1.8 – 2.1 mm longa, 1.2 – 1.4 mm lata. Styli marcescentes; stigmata 3. Antherae 3, 1.8 – 2.1 longae.

Plants cespitose with fibrous light brown roots not densely felted with root hairs; fertile culms 95 – 98 cm tall, obscurely trigonous, smooth with 3 – 4 reddish-purple bladeless basal sheaths. Vegetative shoots 20 – 21 cm tall; leaves 4 – 7, similar to those of fertile culm; pseudoculms to 6 cm tall. Leaves 5 – 11 per fertile culm, mostly basal; (first 4 are 17 cm or less from the rootstock); blades 19 – 45 cm long, 3.2 – 7.1 mm wide, striate; adaxial surface white granular, papillose, midvein smooth or coarsely antrorsely scabrous; adaxial side of outer leaf sheath white septate; abaxial surface glabrous, the margins smooth or minutely antrorsely scabrous; widest leaves 5.0 – 7.1 mm wide; leaf sheaths 3 – 15 cm long, more or less tightly enveloping culms, basal leaf sheaths purple, outer band of sheaths pale green, glaucous, glabrous; inner band of sheaths glabrous, white with or without orange dots (if present, especially prevalent along margins), hyaline, striate; apex broadly, minutely, or slightly convex, not noticeably callosed or discolored with or without a cluster of many orange-brown dots just below, ligules white, membranous, 5 – 6 mm long (or as little as 1 mm long on lower leaves), elongated, lingulate shaped, with a 0.3 – 0.4 mm wide orange-brown or orange-brown dotted fringed band along outer margins. Inflorescences 18 – 31 cm long with the upper 5 – 6 spikes overlapping, the lowest 2 spikes 12.5 – 21 cm apart; spikes 5 – 7, the terminal 2 – 4 staminate, single at nodes, pendulous on antrorsely scabrous slender peduncles; lowermost spikes with peduncles 2.5 – 4.3 cm long, 0.3 – 0.4 mm wide, the uppermost lateral spikes with peduncles 0.7 – 3.5 cm long, and 0.3 – 0.4 mm wide; lowermost bracts with blades 29 – 32.5 cm long and 2.5 – 3.0 mm wide and sheaths 3.4 – 4.3 cm long, the uppermost bracts much reduced in width. Terminal spikes 0.7 – 4 cm long, 1.4 – 3.0 mm wide ca. 15 – 165-flowered. Lateral spikes wholly pistillate or androgynous. If androgynous, distal staminate portion 2.5 – 7.5 mm long, 0.7 – 1.9 mm wide, ca. 1 – 24-flowered and pistillate portion 3.5 – 4.2 cm long, 6.4 – 7.3 mm wide, ca. 70 – 100-flowered. Lower lateral spikes pistillate, 4.5 – 5.5 cm long, 3.5 – 7.5 mm wide, ca. 90 – 110-flowered. Pistillate scales glabrous, 2.6 – 3.0 mm long, 1.0 – 1.5 mm wide, narrowly ovate to broadly obovate, margins either gradually tapered into an attenuate tip or a short awn abruptly arising from the continuation of the midvein; if awned, then awn antrorsely scabrous, to 0.6 mm long. Pistillate scales hyaline, diffusely brown especially near apex to a band of green 0.2 – 0.3 mm wide around midvein. Conspicuous midvein and a faint lateral vein on each side. Staminate scales 3.2 – 5.0 mm long, 1.4 mm wide, narrowly oblong elliptic, acuminate to emarginate apically with a short mucro, hyaline to stramineous, diffuse with reddish brown (rust), 1-veined. Perigynia 3.5 – 4.2 mm long, 1.3 – 1.8 mm wide, trigonous with apically convex sides, mostly pale green turning brown with age, glabrous, 16 – 20-veined, 2 – 3 prominent. Perigynia and beaks patent to reflexed, fusiform,

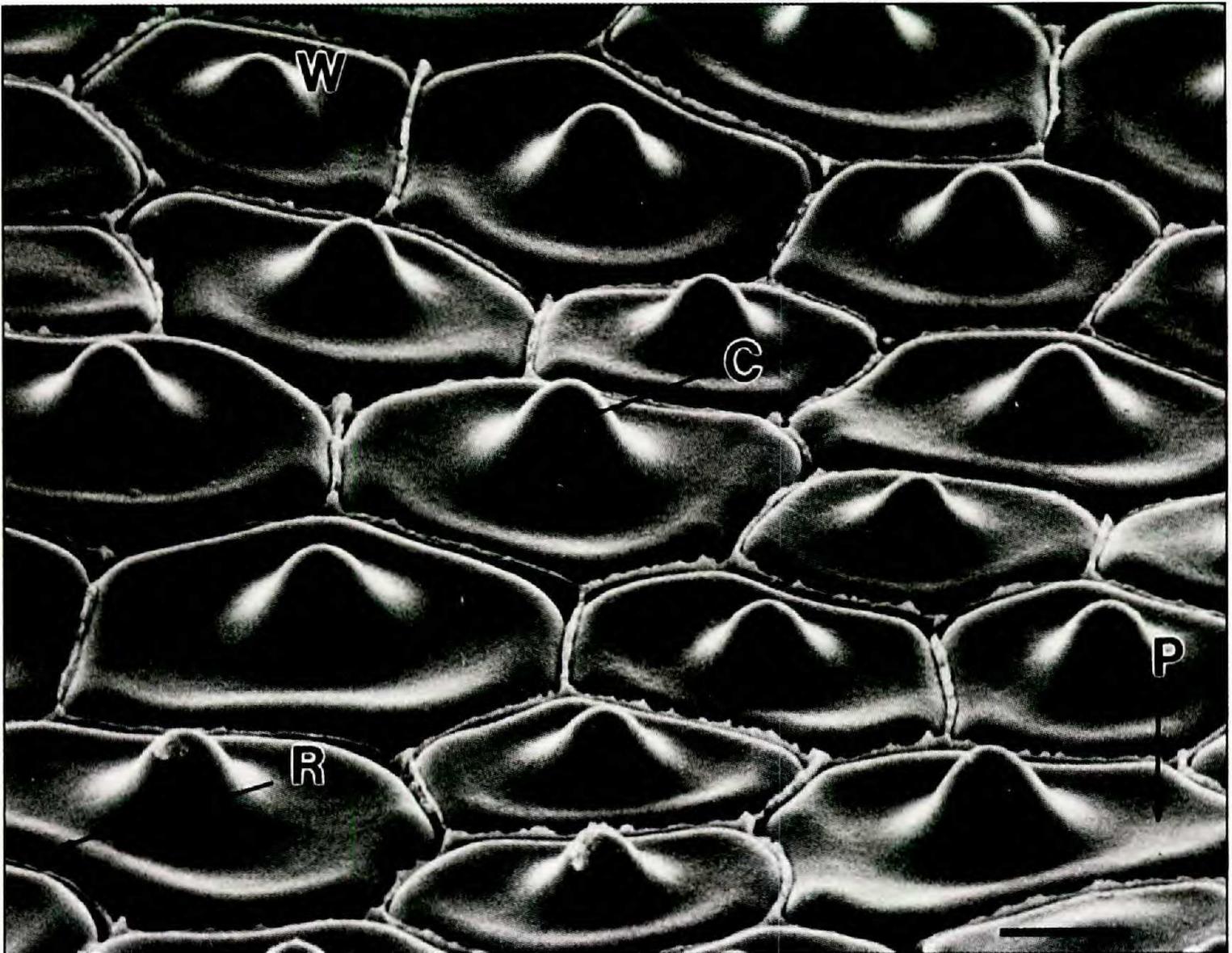


FIG. 2. *Carex rhynchoperigynium*, epidermal cells, SEM micrograph taken from S. & G. Jones 5543 (Holotype: MICH). C. central body. P. silica platform. R. rim. W. anticlinal wall. Bar equals 10 μm .

more or less abruptly beaked. Beaks smooth, 0.9–1.4 mm long, bidentate; inside teeth antrorsely scabrous; teeth 0.3 mm long. Achenes 1.8–2.1 mm long, 1.2–1.4 mm wide, obliquely fusiform, trigonous, tightly enveloped by the perigynium, brown, papillose, stipe up to 0.2 mm long; faces convex, at least apically, occasionally flat. Style withering, strongly contorted near base. Achene epidermal cells (fig. 2) non-isodiametric, single central body in each cell (\pm conical), with slightly raised rim around the edge of the slightly concave silica platform with or without a small silica satellite at the cell angles; anticlinal wall, appearing as mortar, separates each cell. Stigmas 3. Stamens 3, dark brown, anthers 1.8–2.1 mm long.

TYPE: MEXICO. HIDALGO. 47.5 km S on Mex 105 from its jct. with Mex 105 to Ontonga, ca. 1.4 km S of Nonoalco, 1950 m, 19 Jul 1990, S. & G. Jones 5543 and E. Manrique (HOLOTYPE: MICH; ISOTYPES: BRIT/SMU, MEXU, TAES).

Carex rhynchoperigynium was found growing on and at the base of an east-facing shale excarpment in the spray of a waterfall. Associated species include *Tibouchina* sp., *Equisetum* sp., *Bidens* sp., *Bouvardia* sp., *Lycopodium* sp., *Paspalum* sp., *Polypogon semiverticillatus* (Forssk.) Hyl., *Cyperus niger* Ruiz & Pavón, ferns, liverworts, and

mosses. The unusual habitat suggests the possibility that this species may be a very localized endemic. The following key for the Mexican and Central American *Hymenochlaenae* is modified from Reznicek (1986, 1990):

A KEY TO MEXICAN AND CENTRAL AMERICAN
SPECIES OF *CAREX* SECTION *HYMENOCHLAENAE*

1. Lowermost spikes erect on stiff peduncles; all peduncles but the lowermost exerted less than 1 cm beyond sheaths *C. austromexicana*
1. Lowermost spikes arching to pendulous on filiform, flexuous peduncles; lower and middle peduncles exerted more than 1 cm beyond sheaths, except in depauperate individuals.
 2. Perigynium body pubescent.
 3. Lower leaf sheaths hispidulous with red prickle-trichomes; uppermost 3–5 lateral spikes closely aggregated, peduncle of terminal spike 1.8–4.8 (-7) mm long; anthers 1.3–2.5 mm long. *C. caeligena*
 3. Lower leaf sheaths glabrous; uppermost 3–5 lateral spikes not closely aggregated, peduncle of terminal spike 4–17 mm long; anthers 2.3–3.8 mm long.
 4. Pistillate and staminate scales pubescent abaxially, the margins ciliate; perigynium beak with a hyaline, flared, ciliate apex *C. publigluma*
 4. Pistillate and staminate scales glabrous abaxially or scabrous on the midvein, the margins not ciliate; perigynium beak more or less bidentulate at apex *C. mackenziana*
 2. Perigynium body glabrous.
 5. Lower leaf sheaths sparsely to densely hispidulous with red prickle trichomes.
 6. Apex of inner band of leaf sheaths shallowly concave, more or less thickened; lowermost bracts with blades 1.7–5 mm wide; perigynia 2.7–6.0 mm long.
 7. Pistillate scales reddish purple; anthers 2.4–3.2 mm long; perigynia 3.9–6.0 mm long, gradually tapered to apex *C. chiapensis*
 7. Pistillate scales green to stramineous; anthers 1.5–1.8 mm long; perigynia 2.7–4.5(-4.8) mm long, abruptly contracted into a beak 0.6–1.4 mm long *C. perlonga*
 6. Apex of inner band of leaf sheaths deeply concave or even “V” shaped, thin and very fragile; lowermost bracts with blades 1–1.9 mm wide; perigynia 2.8–3.7 mm long *C. flexirostris*
 5. Lower leaf sheaths glabrous.
 8. Widest leaves 11–25.5 mm wide; pistillate scales with a scabrous awn 0.4–4.7 mm long; basal sheaths red.
 9. Ligules 7–29 mm long; pistillate scales with awns 0.4–1.8(-2.4) mm long; lower 5–8(-12) spikes compound with up to 7 secondary spikes *C. steyermarkii*
 9. Ligules 1.5–4.0 mm long; pistillate scales with awns 1.1–4.7 mm long; lower 2–3 spikes sometimes compound, the secondary spikes solitary *C. huebueteca*
 8. Widest leaves 2.3–10.5 mm wide; pistillate scales obtuse to acuminate, awnless or with an awn 0.3–1.5 mm long (in *C. pertenuis* and rarely in *C. caxinensis*); basal sheaths red or brown.

10. Terminal spikes androgynous or staminate proximally and distally and pistillate in middle; lower staminate scales acuminate to awned; basal bladeless sheaths and lower sheaths red to purple.
11. Perigynia 3.9 – 6.0 mm long; widest leaves 6.5 – 7.0 mm wide *C. chiapensis*
11. Perigynia 2.6 – 3.8 mm long; widest leaves 2.3 – 4.6 mm wide.
12. Staminate scales 3.2 – 4.5 mm long, usually scabrous-awned; anthers 1.6 – 2.2 mm long; leaves flat to plicate near apex *C. pertenuis*
12. Staminate scales 4.4 – 7.5 mm long, acuminate and smooth-margined; anthers 2.6 – 4.0 mm long; leaves channeled near apex *C. caxinensis*
10. Terminal spikes staminate; lower staminate scales obtuse to acuminate to scales obtuse to acuminate to emarginate with a short mucro; basal bladeless sheaths and lower sheaths pale brown or brown (except for *C. rhyncho-perigynium*, which are purple).
13. Peduncles single at nodes.
14. Perigynia not strongly red-dotted or purple mottled, outcurved with patent to reflexed beaks; bladeless basal sheaths and lower leaf sheaths reddish-purple *C. rhyncho-perigynium*
14. Perigynia strongly red-dotted and also sometimes purple mottled, straight with ascending to spreading beaks; bladeless basal sheaths and lower leaf sheaths brown.
15. Ligule 8.5 – 14.5 mm long *C. conspecta*
15. Ligule 1.9 – 6 (-7.5) mm long.
16. Abaxial leaf surface smooth and green *C. brunnipes*
16. Abaxial leaf surface whitish-papillose *C. ixtapalucensis*
13. Peduncles 2 – 4 per node at middle of inflorescence *C. tunimanensis*

DISCUSSION

Carex rhyncho-perigynium shares narrow leaves, glabrous perigynia, purplish basal bladeless sheaths, and glabrous lower leaf sheaths with *C. chiapensis*, *C. pertenuis*, and *C. caxinensis*, but is removed from them by having terminal spikes staminate opposed to terminal spikes androgynous or staminate proximally and distally with pistillate in the middle. This feature aligns it with *C. brunnipes*, *C. conspecta*, *C. ixtapalucensis*, and *C. tunimanensis*, although, these all have brown bladeless sheaths and lower leaf sheaths. However, *C. tunimanensis* differs sharply from the above group in having 2 – 4 peduncles per node at middle nodes of the inflorescence while the others have only a single peduncle per node. In addition to the features noted in the key, *Carex rhyncho-perigynium* differs from members of the *C. conspecta* complex by its wider achenes ca. 1.5 times as long as wide verses 2 – 2.5 times as long as wide; and convex or prolonged apex of the inner band (at least on the lower sheaths) rather than concave.

Carex rhyncho-perigynium was found growing on and at the base of an east-facing shale escarpment in the spray of a waterfall, thus giving it the common name of “waterfall sedge”. Its scientific name refers to its strongly beaked perigynia.

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